



Federal Air Surgeon's Medical Bulletin

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Aviation Safety Through Aviation Medicine

For FAA Aviation Medical Examiners, Office of Aviation Medicine Personnel, Flight Standards
Inspectors, and Other Aviation Professionals.

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Who is this masked man? See page 13.



SHARE

This Information With
Your Staff and Patients

Venous Thromboembolic Disease: Risk for Passengers and Aircrew?

By Nick Lomangino, MD

Although air travel is the focus of recent attention, the lack of activity — whether it is a long car, bus, train ride, sitting in the theater or long hours at your desk — is the common co-factor. Therefore, clinicians and the public at large should focus on 'prolonged immobilization.'

RECENT CONCERNS in the global news have again raised an issue about the association of thromboembolic disease and air travel. The association of venous thromboembolic disease (VTE) and inactivity was first described in persons sleeping on deck chairs in bomb shelters during the London blitz of WWII. In 1954, John Homans (1) reported several cases of venous thrombosis involving restricted activity.

Signs and symptoms of VTE include paresthesias, swelling, chest pain, discoloration or pain in the dependent extremity, dyspnea, and cardiac arrhythmias. The clinical presentation is dependent upon the simple development of thrombosis or the addition of embolic activity. Although the lower extremity is involved in the preponderance of cases, upper extremity involvement has also been described.

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Some Important Requests Concerning AMCS

THE AEROMEDICAL CERTIFICATION Division has been having significant problems with aviation medical examiners who send in 8500-8s (Form 8500-8, the FAA medical application form) with blank backs (the medical exam) but do not transmit the electronic copy of the form!

Dr. Jon Jordan, the Federal Air Surgeon, decided that AMEs who transmit their examinations have the option of not completing or signing the back portion of the form. However, when no electronic form is transmitted, we have no means of identifying who performed the exam, as well as whether the applicant was examined and what were the results of the examination.

We routinely check the examination results that are sent, and when we discover this, we forward the uncompleted 8500-8 for further action to the Regional Flight Surgeon who is located in the airman's area. Please note that Aviation Medical Examiner System Order 8520.2E, on Page 6 (2)(h) *AMCS Usage*, states that, effective October 1, 1999, **all** AMEs (except military, federal, and international AMEs) are required to use the AMCS for the recording, validation, and transmission of airman medical certification data — unless they make a written request for exemption and are given a waiver by the appropriate FAA official. Not transmitting your exams is grounds for termination of

Continued on page 6...

The Federal Air Surgeon's Column

Help!

All Hands Needed to Solve Conundrum

KEEPING UP WITH the demands to efficiently manage the airman medical certification system and expediently make certification decisions has, as I think many of us recognize, been an elusive objective for the Office of Aviation Medicine. Historically, we've had more ups and downs than the stock market in our ability to provide airmen with the timeliness in certification that both they and we would like.

The reasons for the advances and declines are multi-faceted, but they always seem to boil down to one basic truth – too much to do and too little to do it with. We try to solve these

problems through almost constant “juggling” of our resources, as well as making modifications in our organizational structure and changing the way we do business.

While all of these actions are helpful, they never seem to produce lasting results. Full implementation of the Airman Medical Certification Subsystem, while painful in the beginning, is now producing positive benefits. There is much left to be done in making the system fully operational, however, and that will take time. Until that happens, I'm afraid we'll continue to find ourselves spending too much time answering inquiries from congressmen about why it takes so long for our customers to get decisions on their requests for certification.

While I believe inadequate resources are clearly at the heart of the matter, there are other factors involved. Over the last ten years, there has been a dramatic increase in the number of airmen who receive Special Issuances. This may be related to an aging pilot population with a greater likelihood for having medical problems and perhaps greater health consciousness on the part of airmen that leads to earlier diagnosis of medical conditions.

Of more profound impact, however, is what I refer to as increased “flexibility” in our medical certification decision making. This flexibility is created by our willingness to apply to airman medical certification the tremendous advances in medicine that have taken place over the years. Persons who would have otherwise been summarily disqualified a few years ago are now given careful consideration and permitted to engage in aviation activities. Unfortunately, however, many of the cases we consider are medically complex, and the process of consideration is both labor intensive and resource demanding.



Jon L. Jordan, MD, JD

As evidence of our problem, data from the Aeromedical Certification Division indicate that the number of Special Issuances for significant medical conditions (coronary heart disease, pacemakers, valve implants, alcoholism, etc.) granted in the year 2000 were more than double the number granted in 1990. During this same period, the number of airmen with such conditions who elected not to accept an initial denial and to pursue a Special Issuance also nearly doubled. This leads me to believe that, at least in part, more airmen with significant medical conditions are willing to pursue certification because they recognize a great likelihood for success.

I don't have all the answers to our conundrum. Refusing to consider granting Special Issuances is not an option. Failing to look for and identify significant medical pathology in the airman population is also not an option. One thing I know I must do is convince the people holding the “purse strings” that what we do is essential for the safety and future of aviation.

What you can do is to fully support the certification system. We spend too much time correcting errors and omissions committed at the “grass roots” level. Actions you take to improve or maintain the quality of your work will go a long way in freeing up resources to make our part of the system work better and faster. We're in this together, and your help is needed.

JLJ

Federal Air Surgeon's Medical Bulletin

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Aeromedical Certification Update

10 Questions and 10 Answers See How Well You Do on These Pertinent Medical Certification Issues

By Warren S. Silberman, DO, MPH



FELLOW AVIATION MEDICAL examiners, I have been asked to write a series of questions and answers on pertinent medical certification issues. So, here is the first installment.

1 As an AME, can you issue a medical certificate to an airman who was recently diagnosed with hypertension? What are you required to provide the Aeromedical Certification Division to substantiate the certification?

2 An airman comes into your office for a routine first-class medical examination and is wearing a contact lens in one eye that corrects for near vision and, in the other eye, a contact lens that corrects for distant vision. *Should you say nothing?*

3 Can a senior aviation medical examiner grant a medical certificate to an airman with a history of having had a coronary artery bypass graft procedure? (This is the applicant's first visit to your office.)

4 An airman informs you of an episode of vertigo, which had resolved several weeks prior. This airman, who is quite proactive, brought a letter from her treating physician stating that the diagnosis was *Benign Positional Vertigo*. If the exam is otherwise negative, can you grant the airman a medical certificate?

5 Airman Joe comes to you with a letter from his treating physician stating that six months ago, Joe had a PSA level of 15. Biopsies of the prostate demonstrated *adenocarcinoma*. He subsequently had a radical prostatectomy with lymph node resection. The pathology report confirmed the cancer, and there were no positive lymph nodes. *Should you issue a medical certificate to Joe after his normal flight exam?*

6 Airman Jane is a famous aviator with 12,000 flight hours. She presents to you with an eight-month-old diagnosis of *Type II diabetes mellitus*. She has been taking Glyburide, and a recent hemoglobin A1C level was 6.4 (normal 4.4 to 6.4). Jane is also a known hypertensive, taking Metoprolol 50 mg, daily. She already has had a Special Issuance for her hypertension, and the letter from her treating physician mentions that she has been quite stable over the past year with BPs averaging 120-130/70-80. *As her AME, what should you do?*

7 Airman Manson presents to a new AME for a third class medical certificate with a history of a prolonged bout of depression after his turtle passed away. This depression was so significant that his family practitioner placed him on Paxil, which Manson took with no side effects for six months. He had discontinued the Paxil just two days prior to this visit. *What should this AME do?*

8 An airman with *Crohn's Disease* of the colon taking Prednisone (15 mg in the morning and 10 mg in the afternoon because of a recent exacerbation that has since resolved) comes to you for his annual second-class examination. *Can you issue the medical certificate?*

9 What are the requirements of the Medical Appeals Branch for an airman who, six months ago, had a *percutaneous transluminal angioplasty* with stent insertion?

10 A 15-year-old applicant (birth date Feb. 28, 1985) comes into your office on Jan. 29, 2001. He wants you to issue him a Medical/Student Pilot Certificate. His examination is unremarkable. *What should you do?*

Some Things (Almost) Never Change

Selections gleaned from 1961 issues of the *Medical Newsletter*, the predecessor to the *Federal Air Surgeon's Medical Bulletin*:

Questions and Answers (Vintage 1961)

"Waiver" of Medical Deficiencies

1. *Is an aviation medical examiner authorized to grant a "waiver" for physical deficiencies which do not meet standards?*

A. No, he may not but should defer to the FAA...

2. *When does the [Federal] Air Surgeon issue waivers?*

A. If there is operational experience, a special ability demonstrated on practical tests or flight-testing and there is apparent compensation for a static defect, the [Federal] Air Surgeon may issue a certificate appropriate to the airman's certificate held. Such limitations will be specified on the medical certificate issued.

...While Some Things Do Change

In a survey completed in 1961 of all aviation medical examiners, they were asked to report the fees they charged for airman medical examinations. Here are their figures:

Air Transport: \$13.68
Commercial: \$11.03
Student & Private: \$9.68

In a concurrent survey of 1,000 private pilots, these are the AME examination fees they reported:

The usual fee was \$10, with about 10% reporting fees of \$5. The highest fee charged was \$15; the lowest was "no charge," because of military, professional courtesy, etc. For those who paid for their examinations, the average fee was \$9.34.



FOR CORRECT ANSWERS AND DISCUSSION, TURN TO NEXT PAGE.

Dr. Silberman manages the Civil Aeromedical Institute's Aeromedical Certification Division.

Answers, With Page-Number References From the *Guide for Aviation Medical Examiners* (1999)

1. The airman's blood pressure should be less than 155/95. If this is the first time that the hypertension is reported, it would require a letter from the treating physician that goes over the family history and risk factors for coronary artery disease (CAD). In the cardiovascular evaluation, mention of medications, as well as any side effects, should be made. A lipid panel and fasting blood sugar are also required on this initial evaluation. A serum potassium level is needed if the airman is on a diuretic. A maximal Bruce Protocol Stress Test is recommended if the CAD risk factors are elevated. On this initial evaluation, the airman will need a baseline ECG. *If you have all of this, you may issue the medical certificate at the time of the examination (AME Guide, pages 22, 84).*

2. Question 17.b. of the 8500-8 asks the airman if contact lenses are used to correct for near vision. The wearing of a contact lens to correct for near vision in one eye and a lens to correct for distant vision in the other, so-called *monovision correction*, is not permitted. This is because such lenses prevent an individual to see the difference in space between two objects (stereopsis). We have no control over when the airman would wear such lenses. You should educate the airman and tell him this practice is not allowed (pp. 95-7)

3. No AME shall issue a medical certificate to an airman of any class if the airman has had coronary artery disease that has been symptomatic or required treatment. This is true no matter how long ago the airman was treated. The airman will need to request medical certification under section 67.401, Special Issuance of Medical Certificates (Pages 26, 42).

4. Benign positional vertigo is a self-limiting illness that most times resolves completely. The *Guide for Medical Examiners* indicates that you should not issue a medical certificate. However, if the airman provides an adequate note from the treating physician, and if your exam is unremarkable, you may issue the medical certificate. Please make sure that you mail us the letter from the treating physician (Pages 24-25).

5. For prostate cancer, you should defer the case to your Regional Flight Surgeon or the AMCD. In a case such as this, you can phone either of the above-mentioned places and likely can get your airman a medical certificate prior to his departure from your office (Page 75).

6. Diabetes mellitus on oral medications is one of the 15 *specifically disqualifying illnesses*, and thus you must defer the case to the AMCD. The other issue in this case is that Airman Jane is taking an oral hypoglycemic agent and a beta-blocker. Due to the effect that beta-blockers have of masking the symptoms of hypoglycemia, she will ultimately be **denied** by the AMCD. Her treating physician needs to change the antihypertensive medication prior to her reapplying for medical certification (Pages 28; 73-75).

7. As the *Guide* should lead you to believe, this case should be deferred to your Regional Flight Surgeon or the AMCD. Normally, we require a 90-day period for the SSRI or other antidepressant medication to be out of the system before considering medical certification. Recall from my previous writings that *it is not always the medication that one should be concerned over but the condition that is being treated*. In this case, we will require a letter from Manson's treating physician that explains the depressive episode. Was there any suicide ideation or attempt? We will also need a letter from the physician, after substantial time passes, that relates how the applicant is performing off the medication (Page 70).

8. Regional ileitis, or Crohn's disease of the intestine, should be deferred to the FAA for a decision. The AME should provide us with a status of the condition and whether the airman is taking any medications. Once again, a telephone call to the Regional Flight Surgeon or the AMCD with the proper documentation in hand could lead to medical certification at the time of examination. In this case, though, the airman is also on steroids because of an exacerbation. The dose of prednisone that the airman is presently taking is disqualifying. We do not grant medical certification to an airman who is

taking more than a 20-mg equivalent of prednisone daily (Pages 22; 51-52).

9. It will depend on the class of certificate desired. The airman applicant must request consideration under 67.401, Special Issuance of Medical Certificates. For first- or second-class certificates, the airman should wait six months from the date of the procedure before applying. The airman is to provide all the medical records from the event (the hospital admission, discharge summaries, cardiac catheterization report, and report of the stent insertion), a current cardiovascular evaluation, lipid panel, fasting blood sugar, a six month post-event heart catheterization, and a maximal Bruce Protocol Radionuclide Stress Test. For third-class medical certification, a six-month heart cath is not required, nor is the radionuclide portion of the stress test, only a maximal Bruce Protocol Stress Test is required (Appendix B, pages 27-28).

10. An AME cannot issue a Medical/Student Pilot Certificate to an airman who has not reached the 16th birthday. Recall that an AME may issue a *medical certificate* to an individual of any age. It is an internal AMCD policy that, if the prospective student pilot comes into your office within 30 days of the 16th birthday, you can issue both the medical and student pilot certificates with the restriction written on the combination Student Pilot/Medical Certificate, "NOT VALID UNTIL SIXTEENTH BIRTHDATE." In this case, that effective date is February 28, 2001 (Page 5).

How did you do on the certification quiz? Being prepared to make sound certification decisions is basic to your practice of aviation medicine, especially if you are striving, as are most busy physicians, to provide quality service to your patients, while reducing your correspondence burden and call-backs.

Scoring the Quiz

☐ **10 correct:** Congratulations! Your certification decisions are sound.

☐ **8-9 correct:** Not too bad, but you need to do a little work.

☐ **7 or less:** Remedial reading, remedial reading...



An Airman with Schmidt's Syndrome

Case Report, by Melissa A. Mohon, MD, MPH

While this case of concomitant adrenal insufficiency and hypothyroidism is rare, it would not be unusual to see a case of either of these conditions occurring alone, or to see an applicant taking steroids for various other medical conditions. In addition, an airman with a complaint of dizziness, fatigue, and weakness should be evaluated for adrenal insufficiency. This is a commonly overlooked, but increasingly prevalent condition that AMEs should be aware of and consider in the evaluation of an airman presenting with often vague symptomatology.

A 52-YEAR-OLD white male with 592 total hours of pilot time applied for renewal of his third-class FAA airman medical certificate on 8/4/2000. He was found to have a history of chronic seasonal allergies, controlled without medication, and Schmidt's Syndrome, for which he takes daily doses of Synthroid (0.125 mg), Cytomel (2.5 mcg), Hydrocortisone (15.0 mg), Prednisone (2.5 mg), Florinef (0.1 mg), DHEA (75 mg), and Testoderm (5 mg). His physical examination, including near and distance visual acuity, was otherwise normal.

He was initially diagnosed in 1986 with Schmidt's syndrome, which is concomitant adrenal insufficiency and hypothyroidism. His presenting symptoms were dizziness, lightheadedness, nausea, and weakness. Since beginning appropriate hormone replacement therapy, he has had no further symptoms. His laboratory tests in November 1999, including Free T4, TSH, LH, Cortisol, and Testosterone, were all within the normal range.

Discussion

Of the three types of PGAS, Type II is the most common; however, its prevalence is only 15-20 cases per million (6). The prevalence of adrenal insufficiency or hypothyroidism occurring alone is much higher. A recent study in England found that the prevalence of Addison's disease is 2.4 times greater than the 39 per million previously believed (7). It is estimated, however, that 25% of patients with one endocrine abnormality may have another and that 50% of patient's with idiopathic

Continued next page ➤

Schmidt's Syndrome

Schmidt's syndrome is one of the three types of polyglandular autoimmune syndromes (PGAS). Schmidt originally described it in 1926 in two patients with Addison's disease and chronic lymphocytic thyroiditis. Schmidt's syndrome is classified as Type II PGAS. This type involves concomitant adrenal insufficiency and thyroid autoimmune disease, with or without insulin-dependent diabetes mellitus. Type I is a syndrome of candidiasis, hypoparathyroidism, and adrenal insufficiency. Type III involves thyroid autoimmune disease accompanied by either IDDM, pernicious anemia, vitiligo, alopecia, or other organ-specific autoimmune disease (1).

Type II PGAS is seen primarily in women in the second or third decade of life. Gonadal failure is sometimes seen; however, it is less commonly associated with this disorder than the Type I syndrome. There appears to be a genetic predisposition, as most cases are familial; however, the mode of inheritance is unknown (2). In many cases, there is an association with the presence of HLA B8; however, not everyone with this HLA type will develop the disease. Polyglandular autoimmune syndromes or autoimmune polyglandular endocrinopathies, as they are also known, are characterized by the presence of circulating organ-specific antibodies, even in the absence of overt clinical disease. The precipitating events that result in the disease are unknown (3).

Typical initial presenting symptoms, which are most commonly the result of adrenal insufficiency component, include fatigue, dizziness, nausea, vomiting, increased skin pigmentation, muscle cramps, and syncope or loss of consciousness. Hypotension, hyponatremia, hypoglycemia, hyperkalemia, hypercalcemia, low serum cortisol and aldosterone levels, and elevated ACTH are often seen. EKG evaluation may reveal abnormalities, most commonly bradycardia. Adrenal insufficiency occurs in 100% of patients with Type II PGAS. Approximately 70% of patients with Type II PGAS will also have autoimmune thyroid disease, ranging from primary hypothyroidism to thyrotoxicosis but most frequently, chronic lymphocytic thyroiditis. Symptoms of thyroid disease can be the initial presentation; however, this is less commonly the case than adrenal symptoms. Thirty percent will have insulin-dependent diabetes mellitus as well. Hypogonadism occurs in 5-50% of patients with Type II PGAS and may be the first manifestation. Ovarian failure is much more frequent than testicular failure (4). The clinical presentation is the result of the failure to produce glucocorticoids, mineralocorticoids, and androgens. The symptoms are generally gradual in onset, occurring over months, but can occur over a few days (5).

Treatment of PGAS Type II is based on the individual diseases present, but there are some therapeutic cautions that must be observed. Levothyroxine therapy can precipitate a life-threatening Addisonian crisis in a patient with both adrenal insufficiency and hypothyroidism. It is crucial to evaluate adrenal function in all hypothyroid patients if the syndrome is suspected prior to starting thyroid replacement medication (3).

Dr. Mohon was a resident at the Civil Aeromedical Institute when she wrote this report.

AMCS...From Page 1

your designation! If, by some chance, you are given a waiver, you are required to type the back portion of the examination.

We request that all AMEs who transmit the 8500-8 to place the word TRANS at the right upper corner of the front of the 8500-8. Based on the problems that have been occurring, we also request that you:

✓ place a check mark in Block #62. This tells us whether you have issued a certificate.

✓ place your printed name and AME number in Block #64.

Once more, thank all of you who work hard to do the right thing to help us out. You know that if we can process the examinations in an expedient fashion, your airmen will be happy!



Schmidt's...from page 5

Addison's disease have Type II PGAS 6. Therefore, it is important to be aware of the possibility of another potentially incapacitating disease in a patient with an endocrine disorder.

The *Guide for Aviation Medical Examiners* indicates that aviators with Addison's disease (adrenal insufficiency) should be deferred to the Aero-medical Certification Division. Pilots with hypothyroidism may be certified if appropriately replaced and are clinically euthyroid, based on laboratory confirmation. Aviators who are continually using steroids must be deferred certification unless the FAA medical authority has previously cleared the treatment. As a rule, dose equivalents of 20mg prednisone, or less, are acceptable if no side effects are occurring.

In this case, the pilot was asymptomatic, was well controlled on his medications, and his steroid dose was less than 20-mg equivalent of prednisone. Therefore, the airman was certified with the caveat to report any new symptoms or adverse changes in his condition, any change in his medication, or any new side effects. A follow-up report was required in 12 months, including a list of current laboratory results and medications with side effects and dosages.

While this case of concomitant adrenal insufficiency and hypothyroidism is rare, it would not be unusual to see a case of either of these conditions occurring alone, or to see an applicant taking steroids for various other

medical conditions. In addition, an airman with a complaint of dizziness, fatigue, and weakness should be evaluated for adrenal insufficiency. This is a commonly overlooked, but increasingly prevalent condition that AMEs should be aware of and consider in the evaluation of an airman presenting with often vague symptomatology.

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The Winds of Spring

By Paul Collins, MD

THERE IS NO QUESTION about it, the winds of spring are here, along with crocus flowers, migrating birds, and of course, the pilots are starting to thaw out. What I mean is that pilots are seeing days long enough and the sky clear enough that they are being drawn out to the airport.

As an aviation medical examiner, I get the chance to talk to lots of pilots and share their stories. No question that this makes the day in the office more fun, even if it slows me down. What I also like to do is talk about some of the issues of safety in the air. I have handed out some FAA booklets, but I have never been convinced that they help all that much – until now. What I want to let you in on is a great product put out by the FAA about safe flying that is fun to use and very useful. The government actually is here to "help you."

What I am talking about is a series of three CD-ROMs that are put out by **David Hunter**, PhD, of the Federal Aviation Administration. Dr. Hunter is a research psychologist in the FAA Office of Aviation Medicine in Washington, DC – don't think nothing good ever comes out of Washington. You can contact him at:

david.hunter@faa.gov

What we have seen is that rote training about HOW to fly an airplane is all well and good, but there is sometimes a lack of training about WHEN to fly. In the "old" days, it was up to each pilot to figure out his or her limits as to when and where to fly. The learning curve was steep and there was definitely the element of "hard knock" training. The result is that pilot errors and accidents have decreased, but there is still a larger than zero number of pilot error-type accidents that we should be able to avoid.

What has been found is that showing pilots how to do maneuvers and

Continued on page 11...

VENOUS...From Page 1

The incidence of venous thromboembolic (VTE) disease has been reported to be 1 in 1000. Kesteven (2) refined the median estimate to from 1.6 to 1.8 per 1000. However, age-adjusted data demonstrate a wide range from 1 per 10,000 in young adults to 3-5 per 1000 in persons greater than 60 years of age.

Although there are numerous studies in the literature examining VTE disease, variability of population demographics resists meta-analysis. There are no published prospective clinical studies in asymptomatic travelers identifying VTE or activation of the thrombotic system (2). Close examination of the literature clearly demonstrates that VTE is multicausal in nature, resulting in differing etiologic and predisposing factors across different age groups. A dynamic model dependent upon age and co-morbid factors is necessary to understand the relative risk for each set of clinical criteria (3).

Risk factors for VTE include prior personal or family history of VTE, pregnancy, puerperium, obesity, malignancy, hormone replacement therapy, recent trauma (surgical or injury), dehydration, alcohol consumption, lower limb paralysis, low cardiac output syndromes, chronic disease, autoimmune disease, genetic factors (coagulopathies and blood disorders), and finally, immobilization.

Genetic predisposition to excessive clotting is reported to affect 3 to 5% of the general population. When the acquired forms of coagulopathies are considered, the prevalence is even higher. Most prominent amongst this category of disorders are antithrombin III deficiency, Protein S and Protein C deficiencies, Factor V Leiden mutation, lupus anti-coagulant (anti-phospholipids), high Factor VIII concentration, hyperhomocysteinemia, and prothrombin 20210A (3).

Although air travel is the focus of recent attention, the lack of activity

whether it is a long car, bus, train ride, sitting in the theatre or long hours at your desk is the common co-factor. Therefore, clinicians and the public at large should focus on "prolonged immobilization." Having stated this, it is not clear whether immobilization alone is causative for VTE. Berndt and associates (4) reported that none of the comprehensive studies report crew members suffering from thromboembolism. Although the activity of the cabin crew minimizes immobilization effect, the same cannot be said for the cockpit crew. Eklof and associates (5) studied cases of VTE originating from Honolulu International Airport for the 6-year period from 1988 to 1993. It was estimated that 6 million passengers annually traveled through the airport. Forty-four cases of VTE were identified. All but 7 cases had one or more risk factors other than immobilization.

There is only one report suggesting an association between increased activity of coagulation system and the hypobaric hypoxic environment experienced in flight. This study lacked a control group and screening for predisposing genetic factors. There was no association of the increased activity of the coagulation system with VTE. Although the study is not conclusive, it is certainly provocative enough to justify further study (6).

The wisdom of John Homas, written in 1954 (1), is still true today. He wrote, "As is so often true of venous thrombosis, this group of cases reveals a tendency rather than a proved relation of cause and effect." He continued, saying "Such matters are important enough to suggest the advisability of making movements of the toes, feet and lower legs when one is sitting for long periods and of getting up and exercising when opportunity offers." Some have suggested a 5-minute period of activity every hour. This may be problematic in modern aircraft and additionally pose a separate safety risk, as well as

increased opportunity of injury if the aircraft encountered air turbulence.

The House of Lords' Committee on Science and Technology has published recommendations, which can be found at:

www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/121/12109.htm.

The Aerospace Medical Association is likewise actively reviewing this topic for comment.

Avoidance of alcohol, hydration before and during flight, use of compression stockings, and leaving adequate non-obstructive leg room are all measures of self empowerment to lower one's individual risk of VTE. Use of aspirin and or low molecular weight heparin clearly needs consultation with a physician to assess the risk and benefits of pharmacologic intervention.

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Dr. Lowmangino is the Deputy Manager of the Medical Specialties Division at FAA headquarters.

Alzheimer's Disease in an Airman

Case Study, by Arnold Angelici, MD

When does an accomplished veteran pilot lose the mental capability to safely pilot an aircraft? When his family and their physician say so? Even though he presents well to his aviation medical examiner and says he is fit to fly—despite the known diagnosis of Alzheimer's disease—an aviation medical examiner was faced with the question of whether to approve, defer, or deny the issuance of a medical certificate. If the AME is familiar with the airman's medical history, the decision may be easier. If the AME is not familiar with the airman's medical history and suspects that the airman falls into a questionable group for AD, he needs an exam "tool" to determine the extent of the disease.

THIS AIRMAN, A 76-YEAR-OLD veteran bomber pilot of World War II with a medical history of hypothyroidism, well-controlled since 1950, was diagnosed by his family physician as having Alzheimer's disease (AD) in late 1999. He was placed on donepezil (Aricept) and was scheduled to enter a Thalidomide study in December 1999.

The airman's family believed that he should not be flying because he had been experiencing periods of confusion. The family also told their physician that the airman had frequently gotten lost while driving his car. The family doctor wrote to the FAA, expressing their concerns that the airman continues to fly, despite his mental condition.

The Regional Flight Surgeon notified the airman to request that he surrender his medical certificate for cancellation because of his diagnosis of AD and his current use of donepezil. The airman then presented to his aviation medical examiner to apply for a third-class medical certificate. The airman claimed on the 8500-8 form that he was no longer on any medications for AD. The AME reported that the airman's recent and remote memory was "sharp." However, the AME deferred issuing the certificate to the Aeromedical Certification Division.

SHARE

This Information With
Your Staff and Patients

Discussion

The symptoms of gradual cognitive decline and progressive cerebral atrophy characterize Alzheimer's disease. AD involves neuronal degeneration with impaired cholinergic transmission in the cerebral cortex and hippocampus in areas of the brain, particularly associated with memory and high intellectual functioning (1). Accumulation of β -amyloid ($A\beta$) plaques is the pathognomonic feature of AD. Other histopathological hallmarks of this disease are neurofibrillary tangles that are accompanied by widespread synaptic and neuronal loss (1). This loss is seen macroscopically on computed tomography or magnetic resonance imaging as cerebral atrophy (2).

A study performed by the Dementia Research group at the National Hospital for Neurology and Neurosurgery, London, England, showed that the mean (SD) rate of cerebral atrophy was 2.37% (1.11%) of brain volume per year for the AD group and 0.41% (0.47%) per year for the control group (2).

Patients who are given a diagnosis of probable Alzheimer's disease may have been in a preclinical period in which the underlying disease process has been present for the previous ten years (3). In a 22-year prospective study of the Framingham Cohort, Dr. Elias' group noted that it is important to determine the timeline and

the earliest evidence of cognitive decline signaling the preclinical phase of AD and to identify specific neuropsychological tests that have clinical utility in the prediction of this disorder. They also noted lower performance levels with respect to the following cognitive abilities that are associated with the subsequent development of AD:

- verbal and visuospatial episodic memory
- abstract reasoning
- new learning
- verbal abilities, including category and letter fluency
- visuospatial and executive functioning.

In a study identifying individuals who are at an increased risk of developing AD, Dr. B.J. Small's group noted that, using the Mini-Mental Status Examination item scores, the delayed recall and orientation to time items were the only significant predictors of incident AD across a 3-year follow-up period (4). In addition to the change in brain volumes in AD patients, the Dementia Research group at the National Hospital for Neurology and Neurosurgery, London, England, noted that the change in mean (SD) Mini Mental State Exam scores was from 19.6 (4.1) at baseline to 17.1 (6.3) at the second scan in the patients with AD and 29.2 (1.0) to 29.2 (1.1) in the control group (2).

Alzheimer's disease aggregates in families of patients with both early and late disease. In a community-based study of an urban, multiethnic population, Devi's group found a 50% increased risk for AD among first-degree relatives of patients with AD, compared with first-degree relatives of cognitively normal controls. Among relatives of patients and controls combined, women had a 50% greater risk for AD than men (5).

Continued ➤

Dr. Angelici was a resident at the Civil Aeromedical Institute when he wrote this report.

Treatment

Interventions in AD include treatment of the underlying disease process and amelioration of neurochemical deficits produced by the cellular changes (1). Patients on active treatment with cholinesterase inhibitors seem to remain unchanged, while those who receive a placebo decline. The only two acetylcholinesterase (AChE) inhibitors that have been approved by the Food and Drug Administration (FDA) for the treatment of AD are tacrine (Cognex) and donepezil (Aricept). Tacrine was introduced in 1986 and was found to be a strong inhibitor of the butyrylcholinesterase family of enzymes.

Recent studies showed tacrine to possess a broad pharmacological profile, such as blockage of potassium channels, inhibition of the neuronal monoamine uptake processes, and inhibition of monoamine oxidase (1). The serious adverse effects of tacrine, including hepatotoxicity, have made it an unfavorable drug of choice.

The FDA approved donepezil in November, 1996, as a symptomatic therapy for mild to moderate AD. Donepezil is a centrally active, non-competitive, reversible cholinesterase inhibitor. It is rapidly absorbed from the gastrointestinal tract and reaches peak plasma concentration in 2 to 4 hours. It has a mean elimination half-life of 70 hours, with significant variation from patient to patient. The liver metabolizes donepezil, primarily by the cytochrome P450 isozymes 2D6 and 3A4 (6). The long-term effectiveness of donepezil has not been evaluated, but the efficacy for up to 2 years was evaluated in patients who completed the 30-week phase 3 trial and who underwent a long-term, open label study with the medication. For a mean of 40 weeks, patients maintained performance levels better than their original baseline scores (1). Significant side effects of donepezil include nausea, diarrhea, and vomiting that are predictable from an increase in cholinergic activity (6). Insomnia, fatigue, muscle cramps, and anorexia have also been reported.

Aeromedical Concerns

As in the instance of the former bomber pilot cited above, an aviation medical examiner is faced with the question of whether to issue, defer, or deny the issuance of a medical certificate. If the AME is familiar with the airman's medical history, the decision may be easier, since the deterioration from one year to the next may be apparent. If the AME is not familiar with the airman's medical history and suspects that the airman falls into a questionable group for AD, the AME should always defer certification to the AMCD. In the meantime, the physician needs an exam "tool" to determine the extent of the disease. The criteria for probable AD developed by the National Institute of Neurological and Communicative Disorders and Stroke/Alzheimer's Disease and Related Disorders Association require a significant decline in social and occupational function, a decline in memory and at least one other cognitive domain, and an absence of significant medical illness that could cause cognitive decline (7). The "tool" that Dr. Daly's group used to determine which patients in their study were at risk for AD was a series of eight questions. The responses to these questions differed significantly among patients who were considered in normal, questionable, or converter groups. The eight questions and their categories are:

Judgment and Problem Solving

- Does the subject have increased difficulty in handling problems?
- Is there a change in the pattern of driving not secondary to visual difficulty?
- Is the subject's judgment as good as before or is there a change?
- Is the subject having increased difficulty managing finances?
- Does the subject have more difficulty handling emergencies?

Home and Hobbies

- Is the subject having increased difficulty performing household tasks?
- Has there been any change in the subject's ability to perform hobbies?

Personal Care

- Does the subject now need prompting to shave or shower?

Disposition

In the current case, information provided to the Aeromedical Certification Division was incomplete because it did not include an MRI of the brain or approved neuropsychiatric tests. Alzheimer's disease is an insidious and progressive neurological disease with no known cure. Because of the diagnosis of AD, the airman was denied medical certification.

References

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Considering LASIK Eye Surgery?

Think Again

By Mike Wayda

PILOTS KNOW that their vision is the most important sense they possess, and their safety depends on how well they see. The prospect of having refractive surgery done to improve their eyesight—without having to rely on glasses or contact lenses—is an attractive, appealing notion to many.

The advertisements that some practitioners use to attract potential patients make the procedures appear to be swift, painless, convenient, and effective. However, because of the notion that refractive surgery is a simple, fool-proof procedure, aviators might not appreciate what is at risk.

When considering the advantages of refractive surgery to correct vision deficiencies, pilots should also consider the disadvantages before making a decision. They should consult an eyecare specialist to determine how a particular procedure would affect their vision, as well as their work and leisure activities.

One of the most popular and effective methods of vision correction designed to reduce dependency upon glasses or contact lenses is LASIK (laser-assisted in situ keratomileusis) surgery.

LASIK, as well as radial keratotomy and photorefractive keratectomy procedures, have potential adverse effects that could be incompatible with flying duties. These adverse effects include corneal scarring or opacities, worsening or variability of vision, night glare, and haziness of vision.

LASIK practitioners mention that between 95 and 99 percent of their patients are doing well and are pleased with the outcome of their refractive surgery. However, if that leaves a 1 to 5 percent group of patients whose outcome is unsatisfactory, then thousands of people, some of whom are

pilots, are experiencing permanent vision impairment. For some, this could mean the end of flying as a career.

For more information, refer to a detailed article discussing LASIK and PRK procedures that was published in the winter 1998 *Bulletin*.¹ Also, for patient comments on LASIK, visit:

[www.surgicaleyes.com/
explinks.htm#table](http://www.surgicaleyes.com/explinks.htm#table).

Some of the many important factors to consider prior to refractive surgery are contained in the following list that was condensed from a Food and Drug Administration article². The FDA article fully discusses LASIK procedures and includes the major items to consider before deciding whether LASIK surgery is appropriate or not.

A Checklist for LASIK Surgery Candidates

- Career impact — does your job prohibit refractive surgery?
- Eye conditions — do you have or have you ever had any problems with your eyes other than needing glasses or contacts?
- Medications — do you take steroids or other drugs that might prevent healing?
- Stable refraction — has your prescription changed in the last year?
- High or low refractive error — do you use glasses/contacts only some of the time? Do you need an unusually strong prescription?
- Pupil size — are your pupils extra large in dim conditions?
- Corneal thickness — do you have thin corneas? (not everyone has sufficient corneal thickness)

Some Risks and Procedure Limitations

- Overtreatment or undertreatment — are you willing and able to have more than one surgery to get the desired result?
- After treatment, you may still need reading glasses — do you have presbyopia?
- Results may not be lasting — do you think this is the last correction

you will ever need? Do you realize that long-term results are not known?

- You may permanently lose vision — some patients may lose some or *all* vision, experience blindness.
- Development of visual symptoms — glare, halos, starbursts, etc.; night driving might be difficult.
- Contrast sensitivity — vision could be significantly reduced in dim light conditions.
- Bilateral treatment — there are additional risks of having both eyes treated at the same time.
- Patient information — read the patient information booklet about the laser being used for your procedure.

Finding the Right Doctor

- Medical doctor — is your doctor a refractive surgeon?
- Professional care — will you be seen by the surgeon at all visits before and after surgery?
- Experienced — how many eyes has your doctor performed LASIK surgery on with the same laser?
- Equipment — does your doctor use an FDA-approved laser for the procedure you need?
- Informative — is your doctor willing to spend the time to answer all your questions?
- Long-term care — does your doctor encourage follow-up and management of you as a patient?
- Be comfortable — do you feel you know your doctor and are comfortable with an equal exchange of information?

Preoperative, Operative, and Post-operative Expectations

- Do not wear contact lenses just prior to evaluation and surgery — can you go for an extended period of time without wearing contact lenses?
- Have a thorough exam — have you arranged not to drive or work after the exam?
- Read and understand the informed consent — has your doctor given you an informed consent form to take home, carefully read, and completely answer your questions?

Continued ➤

LASIK...from page 10

- No makeup before surgery — can you go 24-36 hours without makeup prior to surgery?
- Arrange for transportation — can someone drive you home after surgery?
- Plan to take a few days to recover — can you take time off to recuperate for a couple of days if necessary?
- Expect not to see clearly for a few days — can you handle the problems associated with fuzzy vision?
- Know the sights, smells, sounds of surgery — has your doctor made you feel comfortable with the actual steps of the procedure?
- Be prepared to take drops/medications— are you willing and able to put drops in your eyes at regular intervals?
- Be prepared to wear an eye shield — you need to protect the eye for a period of time after surgery to avoid injury.

- Expect some pain/discomfort — do you know how much pain to expect?
- Know when to seek help — do you understand what problems could occur and when to seek medical intervention?
- Know when to expect your vision to stop changing — final results could take up to months.
- Make sure your refraction is stable before any further surgery — if you don't get the desired result, do you know not to have an enhancement until the prescription stops changing?

¹ Nakagawara, VB, Wood, K.J., and Montgomery, R.W. LASIK Refractive Surgery: Clinical Considerations for the Pilot. 1998. Oklahoma City, OK: Federal Aviation Administration. *Federal Air Surgeon's Medical Bulletin*, 9804, pp. 10-11.

² For current information about LASIK, visit the FDA's Web site:

<http://www.fda.gov/cdrh/lasik>



FAA Aeromedical Certification Guidelines

The FAA expects that airmen will not resume piloting aircraft until their treating health care professional determines that their post-operative condition has stabilized, there are no significant adverse effects or complications, and the appropriate vision standards are met. When this determination is made, the airman should have the treating health care professional document this in the health care record, a copy of which should be forwarded as soon as possible to the Aeromedical Certification Division. If the health care professional's determination is favorable, the airman may resume flight duties, unless informed otherwise by the FAA.

If the procedure was done between regularly scheduled FAA physical exams, the airman must provide a report to the FAA from the treating health care professional to document the date of surgery, any adverse effects or complications, and when the airman returned to flying duties. If the report is favorable and the airman meets the appropriate vision standards, the airman may resume flight duties, unless informed otherwise by the FAA.

If the procedure was done two years ago, or longer, the FAA may accept the aviation medical examiner's eye evaluation.

A complete ophthalmologic evaluation (with a written report) is required to demonstrate stable visual acuity and lack of deleterious sequelae. The evaluation must include tests of visual acuity, field of vision, night glare, and haziness of vision. There should be no other pathology of the affected eye(s).

Winds...from page 6

learning numbers is just not enough — they need to learn when to exercise “option two” or even “option three.” Up until now, though, it has been hard to reach pilots with this message. This is not because pilots don't want to learn — they have to do a yearly training flight already. They are some of the most “focused-on-safety” people you will ever meet. It is just that many focus on techniques and not that much on setting limits and making decisions.

Enter the CD-ROM! Here is a tool that Dr. Hunter has harnessed to give a “turbocharged” lesson in how to make flight decisions that result in safer outcomes. The result is a series of three CDs that a pilot can order online. The special Web site for the program is:

<http://FlySafe.faa.gov>

The contents are: Self Evaluation, Training, Research, The Library, and Sponsors.

Under the Training Section, you are given the option to order three CD-ROMs that help you make decisions about when and where, not just how to fly. The three CDs are:

- ♦ Making Your Own Rules
 - ♦ Progressive Decision Making
 - ♦ Weather-Related Decision Making
- “Progressive Decision Making” looks at how a pilot can continually scan the environment in and out of the plane and focus on making safer decisions. It is a great way to practice how to make safer choices.

“Weather-Related Decision Making” is important here in Idaho, where we have so many “micro-climates.”

If you have a computer, you can go online and order the CDs, while the supplies last, and then sit back and play “what-if” in the comfort of your own home. It is fun and a great improvement over the “school of hard knocks” some of us came up through.

Have fun, be safe, and get ready for spring!

Dr. Collins is an aviation medical examiner who practices in Boise, Idaho, and obviously enjoys flying.



Office of Aviation Medicine *NEWS*

WARMING UP FOR EVACUATION

The Civil Aeromedical Institute's Protection and Survival Laboratory is conducting the largest aircraft evacuation study ever to be implemented. The study is comparing a variety of aircraft cabin interior arrangements at the Type-III overwing exit, as well as various procedures used to effect an evacuation. More than 2,500 people will be involved in the study. The results of the study will be used to help answer evacuation-related questions posed in the recent National Transportation Safety Board's safety study. A further aim is to apply the findings to joint rulemaking efforts by the Federal Aviation Administration and the European Joint Aviation Authority.



EVACUATE! Interior of CAMI's evacuation simulator with volunteer subjects getting out of an over-wing exit as quickly as possible.

Official FAA digital photos by Rick Butler



**Left:
CAMI
Director Dr.
Melchor
Antuñano
leads the
way.**



Right: Volunteers scramble out as safety monitors stand by to assist. Photographer is from a local TV station.

Below: Subjects are briefed before exiting.



AME TAKES OFF WITH ANGEL FLIGHT

Dr. Don Walker, an aviation medical examiner in Peachtree City, Ga., is a man who believes in a worthwhile mission. Both Walker and his wife, Pamela, are volunteer pilots for Angel Flight, a non-profit organization that flies life-saving missions for patients in need of medical transportation by air.

The Walkers were featured in the March 15 edition of the *Atlanta Journal-Constitution* and were praised for their volunteer work for Angel Flight. They fly an eight-passenger, turbo-charged and pressurized Cessna 421 on their missions. Don Walker says he enjoys helping sick people in need of transportation assistance, and that it is a useful activity that combines his love of both medicine and flying.

An aviation medical examiner since 1989, Walker's medical specialty is



ANGELS IN ACTION. L-R: Patient, Dr. Walker, patient's mother, and Pamela Walker prepare for flight in the Walker's Cessna twin.

surgery. As a physician, his services are especially valuable to the all-volunteer organization, and he uses his knowledge of aviation medicine to consult with those who need to know if a particular patient is fit for flying.

Angel Flight volunteers receive no payment for their time or expenses. For more information about the objectives of the organization, visit the Angel Flight America Web site: www.npath.org/AFAS/default.htm

RADIATION BIOLOGIST THRUST OF AWARD

While he may appear "mild-mannered" to his colleagues at the Civil Aeromedical Institute, radiation biologist Dr. Wallace Friedberg is known as "The Wall" to his fencing competitors.



A long-time devotee of the sport of fencing, Friedberg was honored by the Redlands Fencing Club with a lifetime achievement award for his 30-plus years of participating in and promoting the sport.

Before participating in an Oklahoma-wide tournament on March 24, Friedberg was presented with the award, which came as a "big surprise" to him. When asked what one would need to do to win a lifetime achievement trophy, he said, "You have to be able to survive and to persevere."

In one of his very early matches, Friedberg was somehow wounded and needed a few stitches in his hand. He survived that, as well as other challenges in his life, including a bout with cancer, and he has persevered in his pursuit of excellence in the sport — and at work.

In 1960, Friedberg joined the staff of the Civil Aeromedical Research Institute (as it was known then), and he was among a group of researchers and scientists who were hired first to work at the FAA institute. He and two other CAMI employees are now the only ones of the original "dinosaurs," as they referred to themselves, still working after 41 years.

Friedberg says he takes fencing "very seriously," practicing and taking lessons on a regular basis. He is expert in

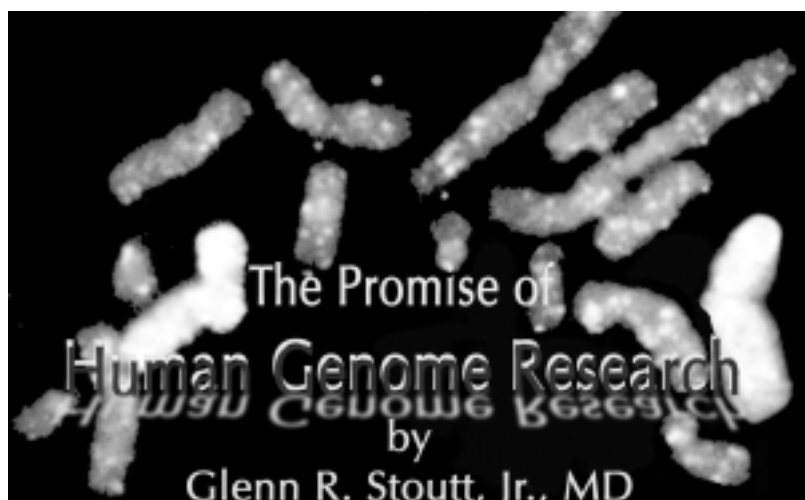


THE WALL. Dr. Friedberg (l.) warming up in a recent match.

the épée, a time-honored weapon wielded in fencing competitions, and he has won the state championship several times.

As a competitor, the 73-year-old Friedberg is acknowledged as being anything other than mild-mannered.

Just for the Health of Pilots



A Brave New World of Medicine

ON JUNE 26, 2000, at a historic White House event with British Prime Minister **Tony Blair**, President **Clinton** announced a breakthrough in genetics and molecular biology that will revolutionize medicine, and maybe civilization as we know it. The Human Genome Project (HGP) has now completed the initial sequencing of the human genome—the genetic blueprint for life.

This multinational project (including France, Germany, Japan, and China) began in 1990 in the United States as a combined effort of the National Institutes of Health and the Department of Energy. A private company, Celera, headed by the brilliant but controversial **Craig Venter**, soon entered the formidable task of sequencing the human genome. Venter made use of the blazing speed of computers to analyze the gene segments by a “shotgun” sequencing technique. Venter said that he can now use a computer to find in 15 minutes a certain gene that had formerly taken 10 years. As a result of the combined efforts of Dr. **Francis Collins** of the HGP and Venter of Celera, the initial genome (genes located on chromosomes) was completed three years

ahead of schedule. *The genome contains all of organism’s hereditary traits.* A fairly accurate “book of life” should be finished in about two more years, by 2003. The government HGP project data will be available to the public; Celera’s may be partially patented for commercial use, causing considerable concern for the government.

James Watson and **Francis Crick** received the Nobel Prize over 50 years ago for discovering the basic double-helix structure of DNA (deoxyribonucleic acid)—the structure inside the nucleus of a cell that carries the genetic instructions for producing living organisms. This discovery set the stage for future research into the human genome. Dr. Watson recently said of the HGP, “Having this book of instructions will change the world.”

This statement is probably not an exaggeration. At Johns Hopkins, Dr. **Victor McKusick**, considered the grandfather of medical genetics, called the results of the announcement of the gene mapping “spectacular.”

Chromosomes are tightly coiled microscopic structures made up mainly of DNA. Genes are pieces of chromosomes containing the **three billion instructions** (base pairs) that give rise to the entire coded map for human life. Our genes determine everything about us: our physical appearance, basic personality, predisposition to certain diseases, longevity, talent, ability to learn, etc. The colossal task now is to identify these bits of DNA information and find out how and what they perform.

The human body contains about 100 trillion cells. Each cell contains a copy of the entire human genome. The nucleus (in the center) contains 46 chromosomes, 22 pairs of autosomes, one pair of each from each parent plus two sex chromosomes, called X or Y. In the male, this combination is an X and a Y (XY); in the female, there are two X chromosomes (XX). If the male supplies a Y chromosome, the baby is a boy (XY); if he supplies an X chromosome, the baby is a girl (XX). Therefore, the male determines the sex of the baby.

Prior to the initiation of the HGP, it was thought that there were about 100,000 genes in the chromosomes. The HGP found there were maybe as few as **30,000**. In these genes—this is where the coding exists—are three billion “letters” (instructions) that control everything that occurs in our body from conception until death.

Continued ➤

Dr. Stoutt is a partner in the Springs Pediatrics and Aviation Medicine Clinic, Louisville, Ky., and he has been an active AME since 1960. No longer an active pilot, he once held a commercial pilot’s license with instrument, multi-engine, and CFI ratings.

These instructions are codes in strands of DNA that signal for the production of amino acids, which are the building blocks of humans. As we learn more about the human genome, we will unlock many of the secrets of life. The ultimate goal is to prevent, treat, and cure the myriad diseases that afflict humankind. Genetic factors play a role in most diseases.

Examples of disorders that are completely on a genetic basis are Down syndrome, resulting from an extra copy of chromosome 21, and cystic fibrosis, from a mutation on chromosome seven. Multiple genes influence the development of diseases such as hypertension, diabetes, Alzheimer's disease, Parkinson's disease, many psychiatric disorders, deafness, rheumatoid arthritis, and some forms of cancer.

The practice of medicine of the future largely will be at the molecular level. Consider our present crude treatment of cancer: cut (surgery), burn (radiation), and poison (chemotherapy). The medicine of today will be thought comparable to the use of leeches and purgatives in the time of George Washington.

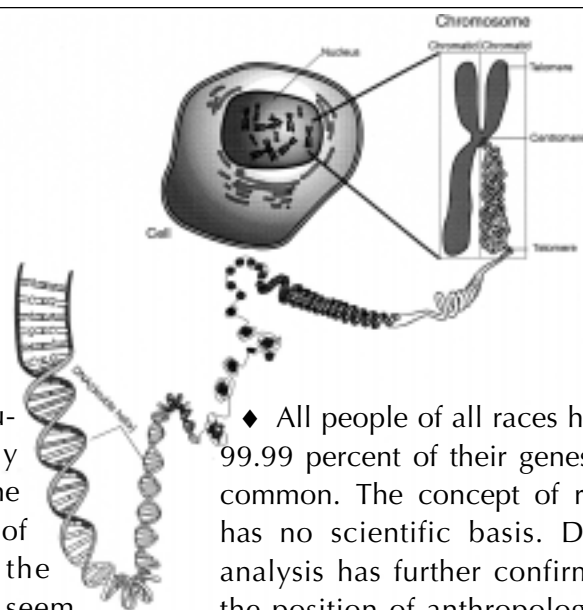
Basic gene research should provide the guideposts for the diagnosis, prevention, and cure of most or all diseases. After all of the human genes are identified, the next step is to understand their function. Then the global scientific community may be able to detect diseases at earlier stages, then make correct diagnoses and design specific drugs for specific diseases. Many of the medications for conditions such as depression and hypertension depend on trial and error to find one that helps. Of course, the perfect solution—not yet available—would be gene repair or replacement.

We are just at the threshold of a Brave New World of Medicine.

Yours for good health and safe flying,

Glenn Stoutt

SOME THINGS TO CONSIDER FROM THE HUMAN GENOME PROJECT



◆ Knowing that humans have slightly more than double the number of genes of the fruit fly or the roundworm may seem humbling. But, we use our genes in multiple ways. It's not how many genes you have but what you do with them. Venter said: "The human spirit is more than the sum total of our genes." Some genes are much "smarter" than those in less-evolved species.

◆ All living things have at least some genes in common; but the DNA in one human hair is unlike that of anyone else living, or who has ever lived.

◆ There is only a one percent difference in the genetic variation of humans and our closest species, the chimpanzee.

◆ Our ancestors appear to have acquired at least 223 genes from bacteria. (An invasion of our genes by bacteria eons ago may be responsible for a type of clinical depression.) Viruses have also entered our genes.

◆ All people of all races have 99.99 percent of their genes in common. The concept of race has no scientific basis. DNA analysis has further confirmed the position of anthropologists and paleontologists: We all originally came from Africa. This may help abolish some intolerance. Our genome can be considered the language in which God created life.

◆ Enormous questions will have to be answered in the fields of morality, ethics, religion, law, philosophy, sociology, politics, and economics. Will your genetic blueprint affect whether you can purchase life insurance, health insurance, or be hired for a job? Is the genome information up for sale by biotech or pharmaceutical companies? Can organs be cloned for people who desperately need them? Consider the possible terrors of human cloning.

◆ The disciplines of mathematics, physics, chemistry, biology, computer science, and medicine will have a never-ending task in studying this voyage into ourselves.

Note: The views and recommendations made in this article are those of the author and not necessarily those of the Federal Aviation Administration.

Meetings Calendar

International Events of Interest for 2001

April 24-26, Orlando, Fla.

Annual Corporate Aviation Safety Seminar. Info: Flight Safety Foundation, Suite 300, 601 Madison St., Alexandria, VA 22314; Phone: (703) 739-6700; FAX: (703) 739-6708; Web site: www.flightsafety.org

May 6-10, Reno, Nev.

Aerospace Medical Association annual scientific meeting: *Emerging Technologies of the New Millennium*. Info: AsMA, 320 S. Henry St., Alexandria, VA 22314-3579; Phone: (703) 739-2240; FAX: (703) 739-9652; Web site: www.asma.org

June 25-27, Jerez de la Frontera, Spain

FAI International Symposium on Air Sports Medicine. Info: Dr. Pedro Ortiz; Phone: 34-91-587-3948; FAX: 34-91-345-1908; E-mail: portizg@nexo.es; Web site: www.fai.org/medical/wag-symposium.html

September 27-29, Singapore

Asian Emergency Care & Defence Medicine International Exhibition and Conference. Info: Healthcare Division-ITE Group Plc; Phone: 44-207-596-5172; Web site: www.ite-exhibitions.com

September 16-20, Geneva, Switzerland

International Academy of Aviation and Space Medicine's International Congress of Aviation and Space Medicine. Info: Dr. Alain Martin Saint Laurent, CEMPN-Air France, 3 Place de Londres, BP 10201, 95703 ROISSY - CDG cedex - France; Phone: 33-1-48-642103; FAX: 33-1-48-641743; e-mail: almartinsaintlaurent@airfrance.fr; Web site: www.iaasm.org

Oct. 11 - 13, Atlanta, Ga.

Civil Aviation Medical Association Annual Scientific Session: *The Changing Face of Civil Aviation Medicine*. Info: Jim Harris, CAMA, P.O. Box 23864, Oklahoma City, OK 73123-2864; Phone: (405) 848-3831; Website: www.civilavmed.com

AME TRAINING

Aviation Medical Examiner Seminar Schedule 2001

April 20 - 22	-----	McLean, Va.	-----	OOE (2)
May 6 - 10	-----	Reno, Nev.	-----	AP/HF (3)
May 21 - 25	-----	Oklahoma City, Okla.	-----	Basic (1)
June 11 - 15	-----	Oklahoma City, Okla.	-----	Basic (1)
July 20 - 22	-----	Atlanta, Ga.	-----	N/NP/P (2)
August 24 - 26	-----	Salt Lake City, Utah	-----	CAR (2)
September 10 - 14	-----	Oklahoma City, Okla.	-----	Basic (1)
October 26 - 28	-----	Charleston, S.C.	-----	OOE (2)
December 3 - 7	-----	Oklahoma City, Okla.	-----	Basic (1)

2002

January 11 - 13	-----	Fort Worth, Texas	-----	AP/HF (2)
February 15 - 17	-----	Tampa, Fla.	-----	N/NP/P (2)
March 18 - 22	-----	Oklahoma City, Okla.	-----	Basic (1)

CODES

AP/HF --- Aviation Physiology/Human Factors Theme

CAR ----- Cardiology Theme

OOE ----- Ophthalmology - Otolaryngology - Endocrinology Theme

N/NP/P -- Neurology/Neuro-Psychology/Psychiatry Theme

- (1) A 4½-day basic AME seminar focused on preparing physicians to be designated as aviation medical examiners. Call your regional flight surgeon.
- (2) A 2½-day theme AME seminar consisting of 12 hours of aviation medical examiner-specific subjects plus 8 hours of subjects related to a designated theme. Registration must be made through the Oklahoma City AME Programs Branch, (405) 954-4830, or -4258.
- (3) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). Registration must be made through AsMA at (703) 739-2240.

The Civil Aeromedical Institute is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

